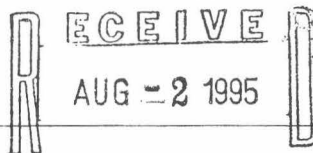




**HARTCROWSER**

Earth and Environmental Technologies

Division of Environm.



Coeur d'Alene Field Office

Hart Crowser, Inc.  
1910 Fairview Avenue East  
Seattle, Washington 98102-3699  
Fax 206.328.5581  
Tel 206.324.9530

*Letter of Transmittal*

To: Idaho Department of Health and Welfare Date: July 31, 1995  
Division of Environmental Quality Job No.: 2296-05  
2110 Ironwood Parkway  
Coeur d'Alene, ID 83814-2648

Attn: Mr. Craig Beck

Re: Avery Landing Site

We are sending the following items:

Date	Copies	Description
7/31/95	1	First Quarter Performance Report for Product Recovery System - Avery Landing, Idaho

These are transmitted:

- ☐ For your information    ☐ For action specified below    ☐ For review and comment    ☐ For your use    ☒ As requested

*Remarks*

On behalf of Potlatch Corporation, we are submitting the attached letter report as required by the Consent Order for the Avery Landing Site.

By:

Barry Kellems

Barry L. Kellems, P.E.

Title:

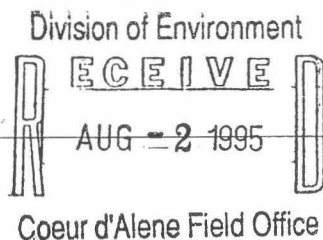
Associate

Copies to: Gregg Rapp, Potlatch

BLK:yw  
ISTQ:lot



Earth and Environmental Technologies



Hart Crowser, Inc.  
1910 Fairview Avenue East  
Seattle, Washington 98102-3699  
Fax 206.328.5581  
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J-2296-05

July 31, 1995

Mr. Gregory A. Rapp  
Construction Services Manager  
Potlatch Corporation  
1100 Railroad Avenue  
P.O. Box 386  
St. Maries, Idaho 83861

Re: First Quarter Performance Report  
Avery Landing Recovery System

Dear Mr. Rapp:

Hart Crowser is pleased to present the First Quarter Performance Report for the free product recovery system at the Avery Landing site. This letter report presents the first quarter groundwater elevation and product thickness measurements and contains an analysis of the effectiveness of the recovery system with respect to free-product capture.

#### OPERATIONAL CHRONOLOGY AND SCHEDULE

The project chronology and remaining schedule for 1995 are shown in Tables 1 and 2, respectively. The recovery system was completed and first placed into operation at the end of October 1994. Startup and optimization of a dual-pump recovery system such as the Avery Landing facility typically requires frequent site visits for a month or longer. Winter conditions limited site access, and the recovery system was shut down for the winter on December 9, 1994.

After the winter shutdown period, the recovery system was restarted on April 10, 1995. Startup activities with intermittent operation continued until May 19, 1995, after which all pumps have been continually operational. On June 30, 1995, we collected



groundwater elevation and product thickness measurements representing the first quarter of operation (April, May, and June). This letter report presents and discusses those results.

Because of the inability to operate the recovery system over the winter months, we propose to conduct two more monitoring events this year, one in September and one prior to system shut down in November or December, depending on the weather and access.

**Table 1 Avery Landing Recovery System  
Project Implementation Chronology**

Completed Milestone	Date
Submit Final Plans and Schedule to IDEQ	August 5, 1994
Pre-Construction Meeting	August 10, 1994
Begin Construction of Recovery System	September 8, 1994
Complete Construction and Startup System	October 27, 1994
Submit Results for Stockpiled Soils to Potlatch	November 4, 1994
Shut Down Recovery System for Winter	December 9, 1994
Submit Record of Construction Drawings and Documentation Report to IDEQ	January 9, 1995
Submit Pre-Construction Flow Map to Potlatch	February 6, 1995
Startup Recovery System in Spring	April 10, 1995
System Startup Complete	May 19, 1995
Conduct 1st Quarter Monitoring	June 30, 1995





**Table 2 Avery Landing Recovery System  
Remaining Project Schedule for 1995**

Scheduled Milestone	Date
Submit 1st Quarter Performance Report	July 31, 1995
Conduct 2nd Quarter Monitoring	September 15, 1995
Submit 2nd Quarter Monitoring Report	October 20, 1995
Conduct 3rd Quarter Monitoring and Shut Down System for Winter	November 30, 1995
Submit 3rd Quarter Monitoring Report	January 5, 1996
Submit Annual Report	January 31, 1996

## **GROUNDWATER ELEVATION AND PRODUCT MEASUREMENTS**

Table 3 presents the groundwater elevation and free product thicknesses measured prior to system start up (October 27, 1994 or September 14, 1994) and the first quarter conditions measured with the system operating on June 30, 1995. The product thickness, which accumulates in the extraction wells, will be variable depending on the cycling of the product recovery pumps. Since we did not shut-off the product recovery pumps during monitoring, the measured thicknesses in the extraction wells do not represent long-term or average values. Rather the data indicate whether product is present in the extraction trenches.

During startup of the system in April 1995, highly variable product was observed to be flowing into extraction wells EW-2, EW-3, and EW-4. No free product was observed in well EW-1. In an effort to document the variable nature of the product, samples were collected from the wells and tested for specific gravity (s.g.) relative to water. The measured specific gravities are reported below:





EW-2	s.g. = 0.88
EW-3	s.g. = 0.91
EW-4	s.g. = 0.95

These data indicate that variable products are present at the site.

### EVALUATION OF RECOVERY SYSTEM EFFECTIVENESS

Product thickness has increased in wells HC-4 (from 2.0 to 3.6 feet thick), EW-2 (from 0 to 0.32 foot thick), and EW-3 (from 0 to 0.45 foot thick). EW-4 went from having no product to having a sheen. These data indicate that the system is effective in inducing product to flow to the extraction trenches by increasing the groundwater gradient. Free product has been recovered from recovery trenches EW-2, EW-3, and EW-4. Currently there is no free product in recovery trench EW-1. As of the end of June, a total of 60 gallons of free product had been collected in the free product storage tank since system startup. We expect the rate and amount of free product recovery to increase now that the system is approaching steady state.

Figure 1 is a site plan showing the monitoring wells, extraction trenches, system piping and groundwater flow direction based on the first quarter measurements. It has been necessary to correct the groundwater elevations in wells HC-4, EW-2, and EW-3 because of the presence of free product. An average specific gravity of 0.9 has been used to convert the measured product thicknesses to the equivalent groundwater depression resulting from the product. Figure 2 is a copy of the pre-construction flow direction map previously submitted and is included here for comparison.

Figure 1 indicates that the trench is working as a product interception trench between the free product plume and the river. The groundwater elevation in trenches with free product is below the river level at the corresponding locations, with trenches EW-2 and EW-4 almost one foot below the river water level. Groundwater contours show that the flow is either from the river to the trench or flat, except possibly at the east end of the EW-1 trench. However, EW-1 does not currently contain any free product. Also note that the contours represent 0.5 foot elevation differences. The gradient in the immediate vicinity of the trench is probably from the native formation, to the trench backfill, and then to the extraction well.





Potlatch Corporation  
July 31, 1995

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Page 5

## LIMITATIONS

Work for this project was performed, and this letter prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar location, at the time the work was performed. It is intended for the exclusive use of the Potlatch Corporation for specific application to the referenced property.

If additional information or clarification is required, please call Barry Kellems at (206) 324-9530.

Sincerely,

**HART CROWSER, INC.**

**TERRY MONTOYA**  
Project Engineer

TWM/BLK:yw  
potlatch.ltr

**BARRY L. KELLEMS, P.E.**  
Associate

### Attachments:

Table 3 Avery Landing Pre-Operation (1994) and First Quarter (1995) Groundwater Elevations and Product Thickness Data

Figure 1 Avery Landing First Quarter Groundwater Flow Direction Map

Figure 2 Avery Landing Pre-Construction Groundwater Flow Direction Map



Table 3 Avery Landing Pre-Operation (1994) and First Quarter (1995)  
Groundwater Elevations and Product Thickness Data

Well	Date	Depth to - Product	Depth to Water	Product Thickness	T.O.C. Elevation	Groundwater Elevation
EW-1	10/27/94	ND	11	0	95.34	84.34
	6/30/95	ND	10.9	0	95.34	84.44
EW-2	10/27/94	ND	10.37	0	95.24	84.87
	6/30/95	10.57	10.89	0.32	95.24	84.35
EW-3	10/27/94	ND	10.05	0	95.78	85.73
	6/30/95	9.35	9.8	0.45	95.78	85.98
EW-4	10/27/94	ND	8.05	0	94.32	86.27
	6/30/95	7.84	7.85	0.01	94.32	86.47
HC-1	10/27/94	ND	13.25	0	97.5	84.25
	6/30/95	ND	12	0	97.5	85.5
HC-4	10/27/94	13.3	15.34	2.04	98.94	83.6
	6/30/95	11.89	15.49	3.6	98.94	83.45
MW-4	9/14/94	ND	12.88	0	99.76	86.88
	6/30/95	ND	10.19	0	99.76	89.57
MW-5	10/27/94	ND	10.45	0	97.76	87.31
	6/30/95	ND	9.13	0	97.76	88.63
MW-11	9/14/94	12	NA	NA	98.16	NA
	6/30/95	5.54	7.25	1.71	98.16	90.41
P-1	10/27/94	ND	17.31	0	101.42	84.11
	6/30/95	ND	16.72	0	101.42	84.7
P-2	10/27/94	ND	15.87	0	100.06	84.19
	6/30/95	ND	15.26	0	100.06	84.8
River EW-1	10/27/94					83.12 *
	6/30/95					84.03 **
River EW-2	10/27/94					84.41 *
	6/30/95					85.32
River EW-3	10/27/94					85.16 *
	6/30/95					86.07
River EW-4	10/27/94					86.49 *
	6/30/95					87.4

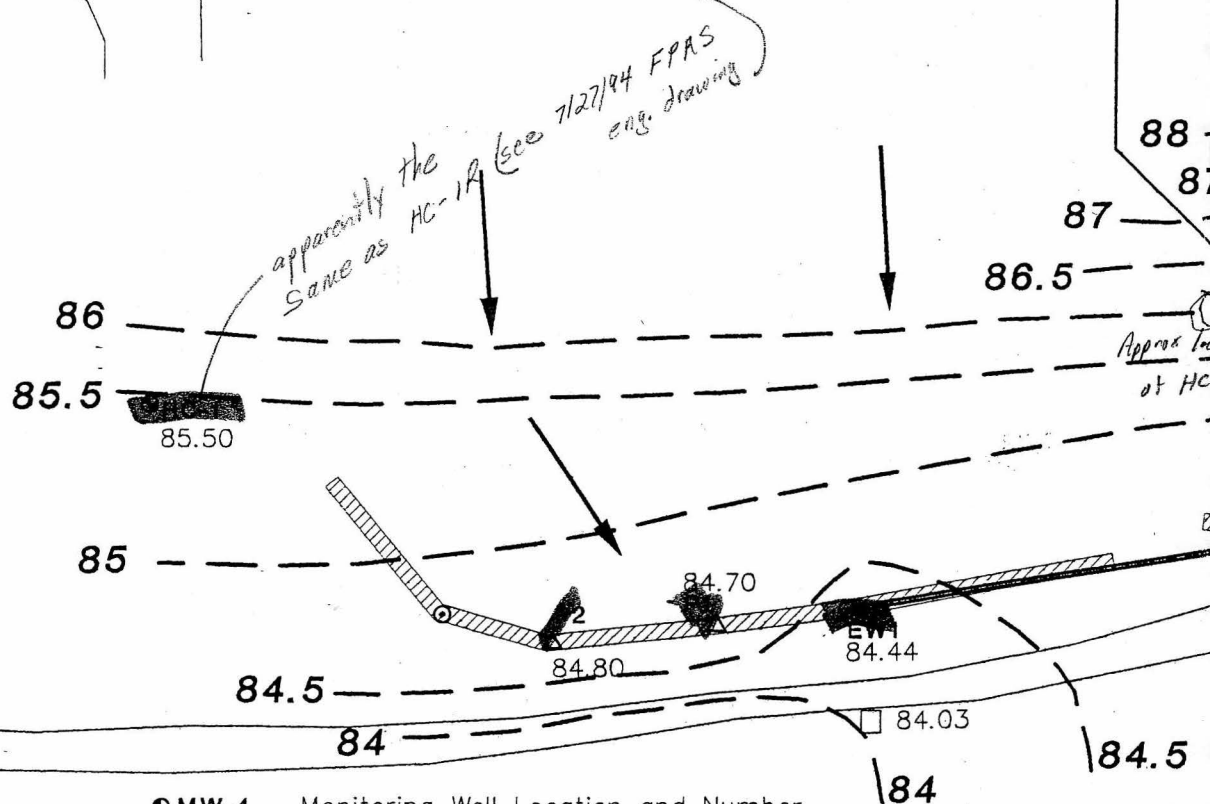
\* River elevation was extrapolated from the river surface slope measured in 1995 and the river elevation measured south of EW-2 in 1994.

\*\* River elevation was extrapolated from river surface slope, based on river elevations measured south of EW-2, EW-3, and EW-4 in 1995.

ND - Not Detected

NA - Not Available

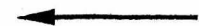
# Avery Landing First Quarter Groundwater Flow Direction Map



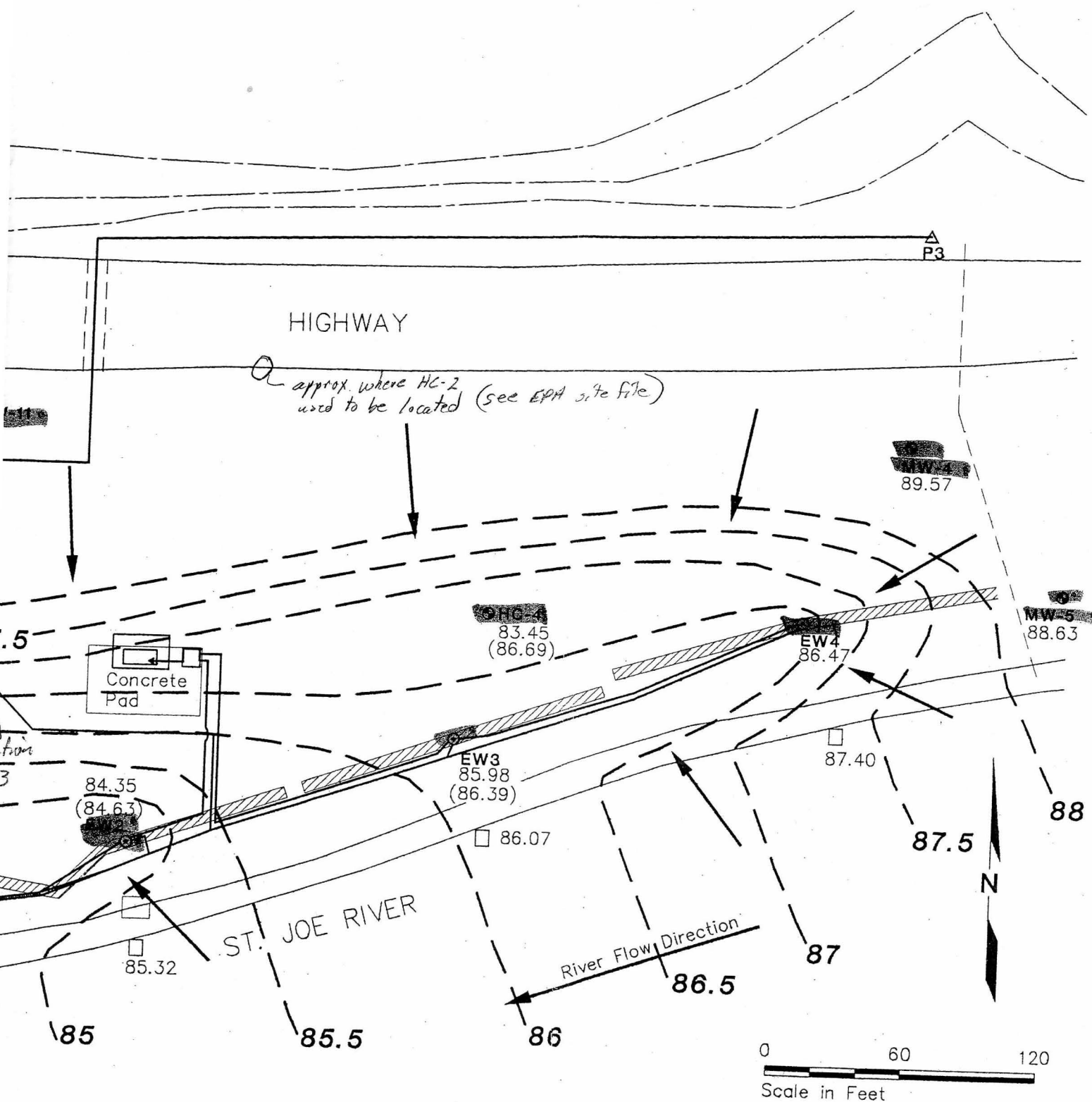
- MW-4 Monitoring Well Location and Number
- 85.50 Groundwater Elevation in Feet (6/30/95)
- (86.69) Corrected Groundwater Elevation due to Free Product in Feet (6/30/95)
- ⊙ EW1 Extraction Well Location and Number
- △ P1 Piezometer Location and Number

□ 87.40

— 84 —







Estimated River Elevation in Feet (6/30/95)

Groundwater Elevation Contour in Feet

Approximate Groundwater Flow Direction

Extraction Trench

Note: Elevation datum is southwest corner of Concrete Pad (100.00 feet)

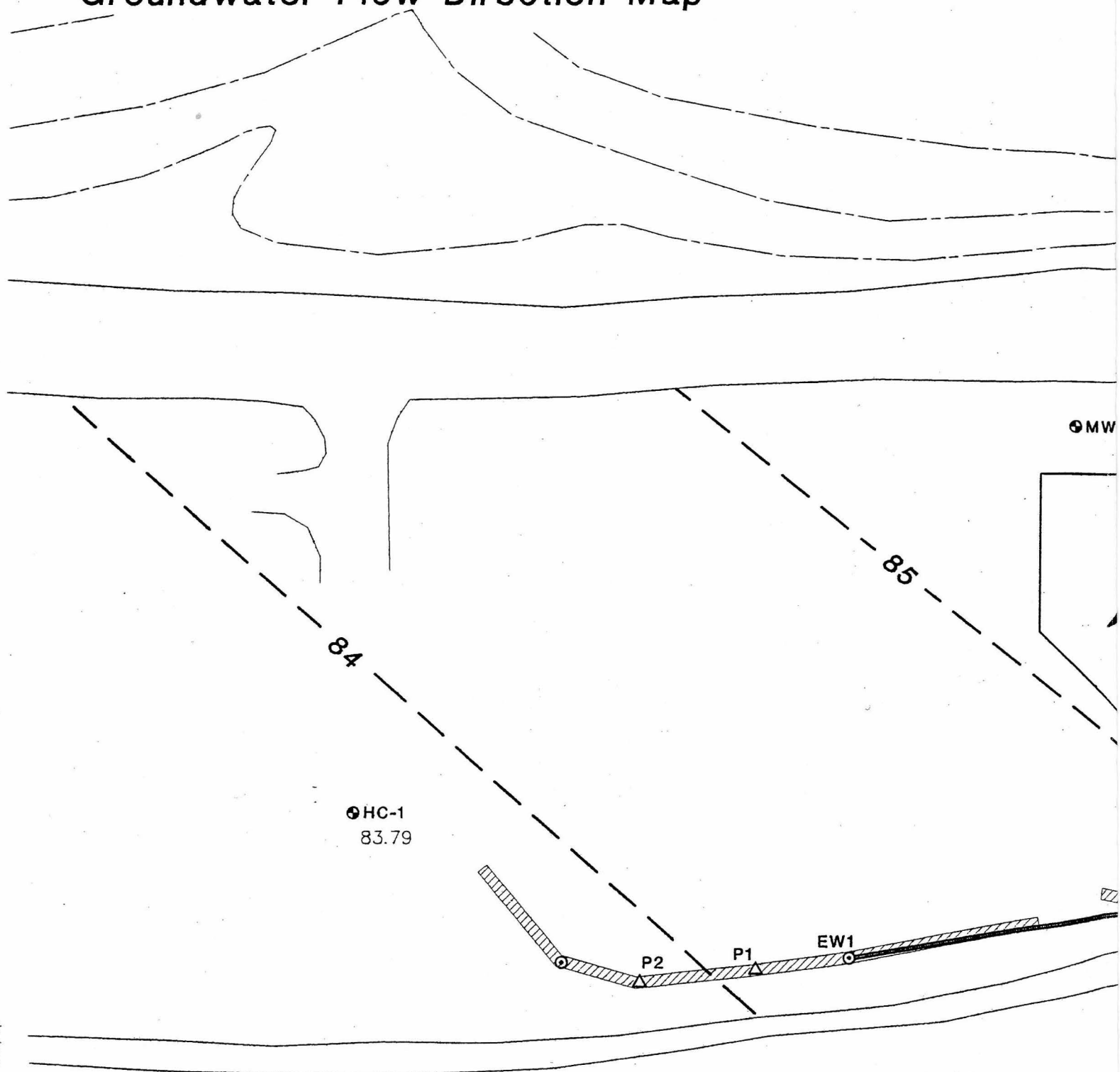


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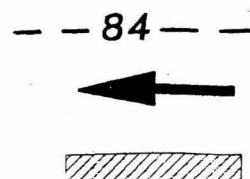
J-2296-05 7/95

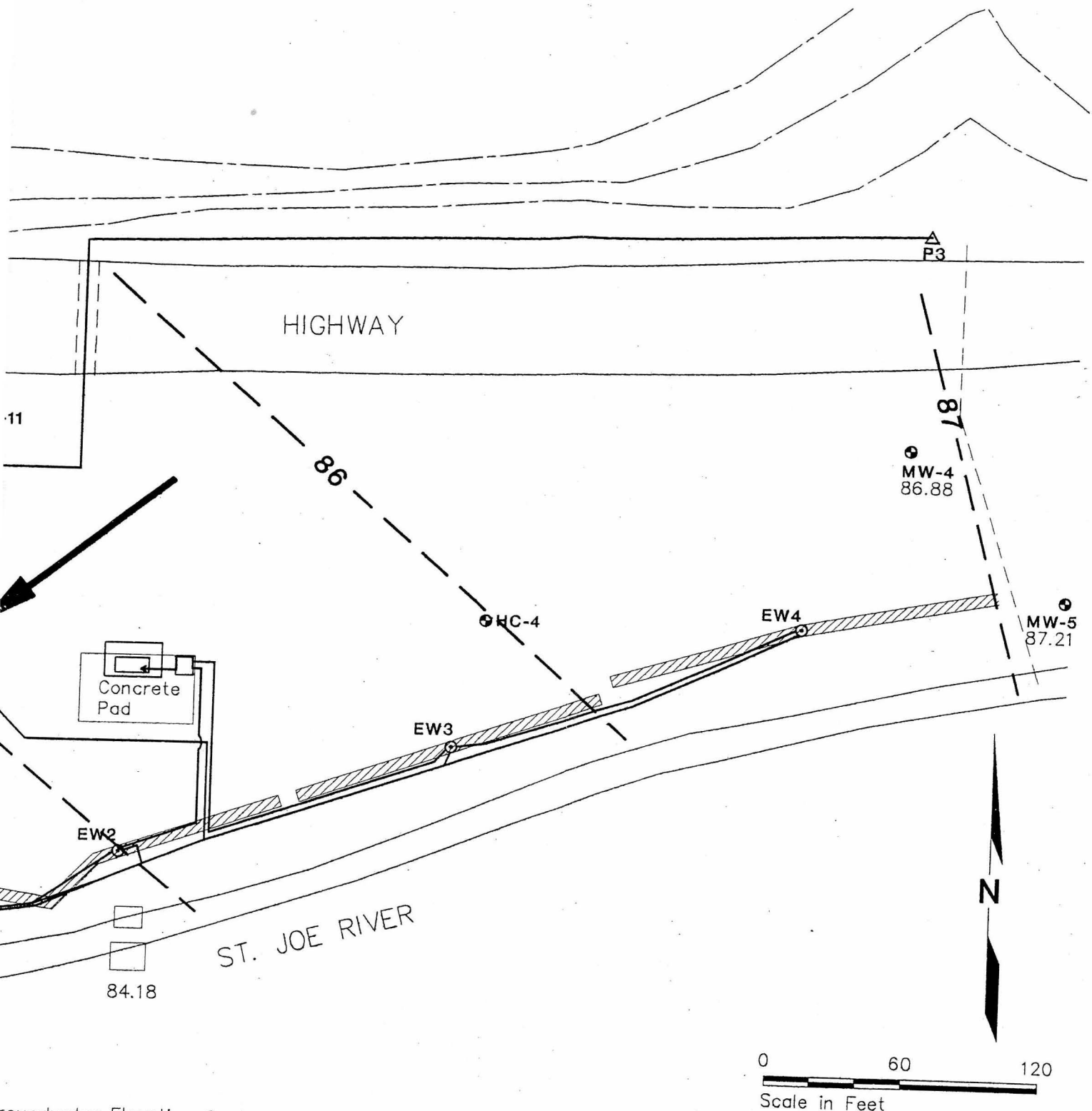
Figure 1

# Avery Landing Pre-Construction Groundwater Flow Direction Map



- HC-1  
83.79
  - MW-4  
86.88
  - EW1
  - △ P1
- Monitoring Well Location and Number  
Groundwater Elevation in Feet (9/14/94)  
Extraction Well Location and Number  
Piezometer Location and Number





Groundwater Elevation Contour in Feet

Approximate Groundwater Flow Direction

Attraction Trench

Note: Elevation datum is southwest corner of Concrete Pad (100.00 feet)

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J-2296-05 7/95  
Figure 2